CLAIMS

What is claimed is:

1. A single-chain variable region fragment (scFv), comprising a heavy chain variable region (V_H) operably linked to a light chain variable region (V_L) wherein said scFv is capable of specifically binding to a molecule on the surface of an antigen-presenting cell (APC).

2. The scFv of claim 1 wherein said APC is a dendritic cell (DC).

3. The scFv of claim 1 wherein said molecule is selected from the group consisting of the mannose receptor (MR), chemokine receptor 1 (CCR1), B7-1 (CD80), B7-2 (CD86), CD40, CD11c, DEC-205, a Toll-like receptor (TLR), and the Fcγ receptor (FcγR).

4. The scFv of claim 3 wherein said molecule is DEC-205.

5. The scFv of claim 3 wherein said molecule is CD11c.

6. The scFv of claim 1 wherein said scFv further comprises a polypeptide linker operably linked between said V_H region and said V_L region.

7. The scFv of claim 1 wherein said scFv further comprises an affinity tag.

8. The scFv of claim 7 wherein said affinity tag comprises one or more hexahistidine.

9. The scFv of claim 1 wherein said V_H region and said V_L region are each at least 70% identical to the V_H and V_L regions of monoclonal antibody NLDC-145 disclosed herein in SEQ ID NOs: 5 and 6, respectively.

10. The scFv of claim 1 wherein said V_H region and said V_L region are each at least 90% identical to the V_H and V_L regions of monoclonal antibody NLDC-145 disclosed herein in SEQ ID NOs: 5 and 6, respectively.

11. An scFv/antigen complex, comprising an scFv of any one of claims 1-10 complexed with an antigen.

12. The scFv/antigen complex of claim 11 wherein said complex comprises a chemical crosslink between said scFv with said antigen.

13. The scFv/antigen complex of claim 11 wherein said complex comprises a fusion protein comprising said scFv and said antigen.

14. The scFv/antigen complex of claim 11 wherein said scFv further comprises an affinity tag.

15. The scFv/antigen complex of claim 14 wherein said affinity tag comprises one or more hexahistidine.

16. The scFv/antigen complex of claim 11 wherein said complex further comprises a lipid.

17. The scFv/antigen complex of claim 16 wherein said lipid is a metal-chelating lipid.

18. The scFv/antigen complex of claim 17 wherein said metal-chelating lipid is nitrilotriacetic acid ditetradecylamine.

19. The scFv/antigen complex of claim 11 wherein said antigen is from a bacterium selected from the group consisting of *Mycobacterium*, *Chlamydia*, and *Ehrlichia*.

20. The scFv/antigen complex of claim 19 wherein said antigen is a *Mycobacterial* antigen, or fragment, derivative, or variant thereof, selected from the group consisting of 85B, MPT64, and ESAT-6 as presented herein in SEQ ID NO:14, SEQ ID NO: 16, and SEQ ID NO: 18, respectively.

21. The scFv/antigen complex of claim 20 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 70% identical to the sequence presented herein in SEQ ID NO: 14.

22. The scFv/antigen complex of claim 21 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 90% identical to the sequence presented herein in SEQ ID NO: 14.

23. The scFv/antigen complex of claim 22 wherein said scFv/antigen complex is the scFv NLDC-145-85B presented herein in SEQ ID NO: 8, or fragment, derivative, or variant thereof.

24. The scFv/antigen complex of claim 23 wherein said scFv/antigen complex is at least about 70% identical to the scFv NLDC-145-85B presented herein in SEQ ID NO: 8.

25. The scFv/antigen complex of claim 23 wherein said scFv/antigen complex is at least about 90% identical to the scFv NLDC-145-85B presented herein in SEQ ID NO: 8.

26. The scFv/antigen complex of claim 11 further comprising a cytokine selected from the group consisting of IL-12, IL-6, IL-4, IL-1, IFNγ, GM-CSF, and TNF.

27. The scFv/antigen complex of claim 11 further comprising an inducer of a DC response to said antigen wherein said inducer is selected from the group consisting of a lipopolysaccharide (LPS) or other cell wall component, a non-methylated CpG motif, and a double-stranded RNA.

28. A fusion protein comprising an antigen-presenting cell (APC) binding protein and an antigen wherein said fusion protein is capable of specifically binding to a molecule on the surface of an APC and inducing an antigen specific T-cell response.

29. The fusion protein of claim 28 wherein said molecule on the surface of said APC is selected from the group consisting of the mannose receptor (MR), chemokine receptor 1 (CCR1), B7-1 (CD80), B7-2 (CD86), CD40, CD11c, DEC-205, a Toll-like receptor (TLR), and the Fcγ receptor (FcγR).

30. The fusion protein of claim 28 wherein said molecule on the surface of said APC is DEC-205.

31. The fusion protein of claim 28 wherein said molecule on the surface of said APC is CD11c.

32. The fusion protein of claim 28 wherein said antigen is a *Mycobacterial* antigen, or fragment, derivative, or variant thereof, selected from the group consisting of 85B, MPT64, and ESAT-6 as presented herein in SEQ ID NO: 14, SEQ ID NO: 16, and SEQ ID NO: 18, respectively.

33. The fusion protein of claim 28 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 70% identical to the sequence presented herein in SEQ ID NO: 14.

34. The fusion protein of claim 28 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 90% identical to the sequence presented herein in SEQ ID NO: 14.

35. The fusion protein of claim 28 wherein said antigen comprises said *Mycobacterial* antigen 85B presented herein in SEQ ID NO: 14.

36. A polynucleotide for expressing an scFv/antigen complex, comprising a first polynucleotide operably linked to a second polynucleotide wherein said first polynucleotide encodes an scFv of any one of claims 1-15 and wherein said second polynucleotide encodes an antigen.

37. The polynucleotide of claim 36 wherein said antigen is a *Mycobacterial* antigen, or fragment, derivative, or variant thereof, selected from the group consisting of 85B, MPT64, and ESAT-6 as presented herein in SEQ ID NO: 14, SEQ ID NO: 16, and SEQ ID NO: 18, respectively.

38. The polynucleotide of claim 37 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 70% identical to the sequence presented herein in SEQ ID NO: 14.

39. The polynucleotide of claim 37 wherein said antigen is a variant of said *Mycobacterial* antigen 85B wherein said variant is at least about 90% identical to the sequence presented herein in SEQ ID NO: 14.

40. The polynucleotide of claim 39 wherein said scFv/antigen complex is at least about 70% identical to the scFv NLDC-145-85B presented herein in SEQ ID NO: 8.

41. The polynucleotide of claim 39 wherein said scFv/antigen complex is at least about 90% identical to the scFv NLDC-145-85B presented herein in SEQ ID NO: 8.

42. A polynucleotide comprising a polynucleotide that encodes a fusion protein of any one of claims 28-35.

43. A vector comprising a polynucleotide of any one of claims 36-42 operably linked to a transcriptional promoter.

44. A method for introducing an antigen into an antigen-presenting cell (APC) and/or a dendritic cell (DC), said method comprising the steps of:

(a) isolating from patient a sample comprising an APC and/or a DC; and

(b) contacting said APC and/or said DC with the scFv/antigen complex of claim 16,

wherein said scFv/antigen complex is in contact with said APC and/or said DC under conditions and for such time as required to permit said antigen to enter said APC and/or said DC.

45. A method for introducing an antigen into an antigen-presenting cell (APC) and/or a dendritic cell (DC), said method comprising the step of administering to said patient a composition comprising the scFv/antigen complex of claim 16.

46. A method for introducing an antigen into an antigen-presenting cell (APC) and/or a dendritic cell (DC), said method comprising the step of administering to said patient a composition comprising a polynucleotide of claim 36.

47. A method for inducing an immune response in a patient, said method comprising the steps of:

(a) obtaining from said patient a sample comprising an antigen-presenting cell (APC) and/or a dendritic cell (DC);

(b) contacting said sample with the scFv/antigen complex of claim 16 under conditions and for such a time as required to allow binding of said scFv fragment antigen complex to said APC and/or said DC; and

(c) administering said scFv/antigen APC and/or DC-bound complex to said patient.

48. A method of blocking, or substantially reducing, the activity of a target molecule on the surface of an antigen-presenting cell (APC) and/or a dendritic cell (DC), said method comprising the steps of:

(a) isolating from said patient a sample comprising an APC and/or a DC; and

(b) contacting said APC and/or said DC with the scFv of claim 1 under conditions and for such time as required to permit said binding of said scFv to said target antigen,

wherein binding of said scFv to said target molecule blocks, or substantially reduces, the activity of said target molecule.

49. The method of claim 48 wherein said target molecule is a receptor protein selected from the group consisting of the mannose receptor (MR), chemokine receptor 1 (CCR1), B7-1 (CD80), B7-2 (CD86), CD40, CD11c, DEC-205, a Toll-like receptor (TLR), and the Fcγ receptor (FcγR).